GeoLogix

5316 Deep Valley Run
Raleigh, NC 27606
Phone: 919-859-4544

Limited Phase II Environmental Site Assessment

(CONTINUATION OF EARLIER SITE WORK COMPLETED IN OCTOBER, 2000)

for

500 S. Blount St. Tract
Intersection of E. Cabarrus St. and S. Blount St.
Raleigh, North Carolina

prepared for:

City of Raleigh

January 26, 2001

Geological & Environmental Consulting

Professional Geologist • Registered Environmental Manager • Certified Environmental Inspector

LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT
(CONTINUATION OF EARLIER SITE WORK COMPLETED IN OCTOBER, 2000)
FORMER SERVICE STATION AT 500 S. BLOUNT STREET
RALEIGH, NORTH CAROLINA

INTRODUCTION

Additional limited Phase II environmental site assessment work was conducted by *GeoLogix* at the site of a former gasoline service station located at 500 S. Blount St. in Raleigh, North Carolina. The former service station is situated at the intersection of S. Blount and E. Cabarrus Streets. Appendix A includes a map which shows the general location of the subject property. Some preliminary Phase II work was completed at the site last year and documented in a report dated October 4, 2000. At least three, and perhaps four, underground storage tanks (USTs) are suspected of existing on site. The limited Phase II assessment consisted of obtaining soil and groundwater samples from three locations on the property. The samples, obtained January 13, 2001, were analyzed for petroleum hydrocarbon contamination using appropriate EPA analytical methods. This report summarizes site activities, the results of laboratory analyses, and provides conclusions and recommendations.

BACKGROUND

GeoLogix personnel completed a Phase I Environmental Site Assessment for the City of Raleigh on this property (report dated May 3, 2000). It was recommended in the Phase I assessment that a limited Phase II environmental site assessment be conducted. Accordingly, site work was performed in September, 2000, and a report dated October 4, 2000, prepared for the City. It was concluded after the initial Phase II site assessment that additional site evaluation would assist in further determining the extent of contamination.

Historical information regarding operation of the service station on site was limited. A part-owner of the property stated that the facility had not operated as a gas station since the 1950's. However, information supplied by the current renting tenant, Mr. Guy Clay, indicated that the facility may have been used as a service station as recently as the early 1970's.

FIELD ACTIVITIES and SAMPLING

Soil samples were obtained on site using a Geoprobe Model 5400 (Serial No. 9839P54) to advance the bore holes. At two locations, B-1 and B-2, a soil sample was taken at ten and fifteen foot intervals below the surface. In addition to soil samples, a groundwater sample was obtained at boring location B-1. At location B-3, only a groundwater sample was taken.. The soil samples were placed appropriate containers with preservative, if necessary, and kept in a cooler on site. They were later transported to GeoChem Laboratories for analyses.

An attached site sketch (Attachment B) indicates the locations where the geoprobe borings were advanced and soil samples obtained relative to features of the service station and the suspected location of USTs. The groundwater sample obtained at location B-3 was downgradient of the suspected gasoline USTs

Soil samples were collected using direct push technology. Using this method, soil is collected continuously from the surface to sample depths. At location B-1, soil samples were collected at ten and fifteen foot depths. Soil samples collected at locations B-1 and B-2 were obtained using "macro-core" soil sampler technology. This technology uses four-foot clear PVC sleeve sections pushed into the soil. Soil is then collected in the sleeves as the geoprobe advances downward.

A groundwater sample was obtained by advancing the geoprobe boring to the groundwater surface interface and then four feet beyond. The groundwater sample at location B-1 was collected using PVC pipe with a five foot screen (.01 inch slot size) penetrating through the groundwater/soil interface. Groundwater was encountered at roughly twenty-four (24) feet, and the Geoprobe then advanced to a depth of roughly twenty-eight (28) feet. The groundwater sample was extracted using flexible polyethylene/silicon tubing and a "Geopump". The groundwater sample at location B-3 was obtained using a screen point fifteen groundwater sampler advanced to a depth of thirty (30) feet. The probe was pulled back to twenty-four (24) feet and a screen (slot size .0065") pushed back through the sampler tube into the void so that the screen was located between the twenty-four (24) to twenty-eight (28) foot depth (below the surface) level. Flexible tubing was inserted through the rod, and the "geopump" used to procure the sample. Groundwater depth at location B-3 was estimated at twenty-three (23) to twenty-four (24) feet.

ANALYTICAL RESULTS

Soil samples were obtained at ten and fifteen feet below the surface at two boring locations on site (B-1 and B-2). Methods used to analyze the soils were EPA Methods TPH 5030 and TPH 3550 (Total Petroleum Hydrocarbons for light and medium range volatiles, respectively). The groundwater samples collected at locations B-1 and B-3 were analyzed utilizing Method 602 for lighter range volatiles and Method 3510 for diesel (medium) range petroleum hydrocarbons.

Individual boring locations and soil sample analyses (locations on site sketch in Appendix B) are discussed below:

- **Location B-1** - The geoprobe was used to advance a boring in the northwest corner of the tract. Soil sample Nos. B-1-10 and B-1-15 (obtained from ten and fifteen foot depths below the surface in the same bore hole) were analyzed for TPH 3550 and TPH 5030. The results indicated Below Detectable Limits (BDL) for both samples. Groundwater sample Nos. B-1-GW1 and B-1-GW2 indicated BDL for all constituents when analyzed using Methods 3510 and 602, respectively.

- **Location B-2** - Boring B-2 was advanced roughly four feet north of the old service station building on site, and roughly five feet from the western property boundary. Soil sample Nos. B-2-10 and B-2-15 were obtained from ten and fifteen foot depths below the surface and analyzed for TPH 5030 and TPH 3550. Sample Nos. B-2-10 and B-2-15 indicated Below Detectable Limits (BDL) for TPH 3550 and TPH 5030. No groundwater sample was collected at this location.

- **Location B-3** - Boring No. B-3 was advanced roughly three feet west of the edge of the sidewalk adjacent to S. Blount St. and generally downgradient from the suspected location of two gasoline USTs on site. No soil samples were obtained at this location. Groundwater sample Nos. B-3-GW1 and B-3-GW2 were analyzed using Methods 3510 and 602, respectively. Sample No. B-3-GW2, analyzed using Method 602, indicated benzene, toluene, ethylbenzene, and xylenes (all constituents of gasoline) present in the groundwater sample in excess of State of North Carolina Groundwater Quality Standards (15 NCAC 2L). The analysis of Sample No. B-3-GW1 using Method 3510 indicated diesel range contamination in the groundwater sample at that location. However, a note from GeoChem in the analysis results stated that the groundwater samples from location B-3 contained gasoline, not diesel. In a telephone interview, the chemist noted that it is possible for "bleedover" to occur in the diesel range when high levels of gasoline constituents are present in the same sample. In his opinion, that occurred in this instance.

A copy of the laboratory analyses and Chain-of-Custody record for the soil and groundwater samples is contained in Appendix C.

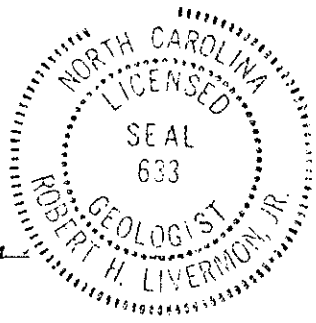
CONCLUSIONS and RECOMMENDATIONS

Direct push technology was used at strategic locations on the subject property, and soil and groundwater samples were obtained and analyzed for appropriate petroleum contaminants. The soil samples were obtained at two location adjacent to the "Richardson Tract" (western property boundary) to determine if contaminants may have migrated downgradient onto the subject property. Specific locations of the borings are described in the above section of this report, and are depicted on the site sketch (Appendix B). Soil samples obtained at location B-1 and B-2 were analyzed using EPA Method 3550 and Method 5030. Groundwater samples, taken at locations B-1 and B-3, were analyzed using Methods 602 and 3510. For reference to geoprobe sampling locations, site photographs are contained in Appendix D.

No contamination was detected in the soil samples obtained at locations B-1 and B-2, nor in the groundwater sample obtained at location B-1. The groundwater sample taken at location B-3, downgradient from the suspected location of two gasoline USTs, indicated contaminants present when analyzed using Method 602 (light volatiles). The four constituents (benzene, ethylbenzene, toluene, and xylenes) detected in Sample No. B-3-GW2 were all in excess of the State of North Carolina's groundwater quality standards. Medium range volatiles were detected in the Method 3510 analysis. However, according to the chemist at the analytical lab, the contaminants indicated in the Method 3510 analysis were due to "bleedover" from elevated levels of light volatiles contaminants present in the groundwater sample.

The results of this follow-up Phase II assessment has shed additional light on the site and allows for several conclusions to be reached. The study appears to indicate that the contamination detected on site in the soil and groundwater is probably not attributable to contaminants which have migrated onto the subject property from an upgradient, off-site source. The likely source of the petroleum contamination is from the two gasoline USTs on site, and/or from leaks associated with the underground piping and dispenser island on site. The light volatiles (likely gasoline) detected in the soil samples obtained just upgradient of the dispenser island during the earlier Phase II soil sampling effort may be due to leaks and/or splashing of gasoline around the former pump dispenser island.

While this site assessment represents an attempt to identify the most likely areas where on-site environmental contamination would be anticipated, there is the possibility that sources of contamination have escaped detection due to the limitations of this study or the inaccuracy of information furnished by other parties used to arrive at the conclusions reached in this report. The findings contained in this report are relevant to the dates of the site work and should not be relied upon to represent site conditions at other times.



Robert H. Livermon, Jr., P. G.

APPENDICES

A. SITE LOCATION MAP

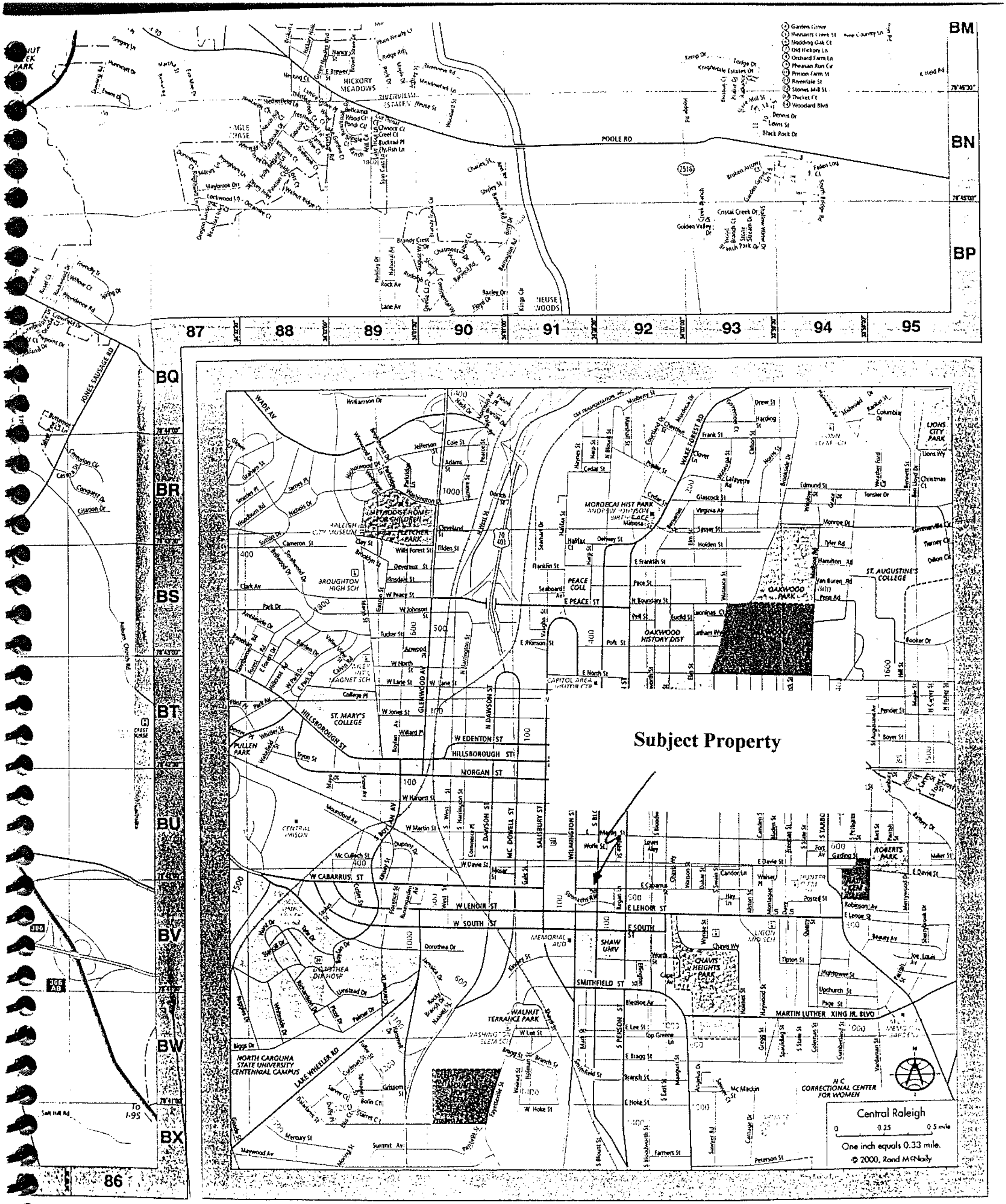
B. SITE SKETCH and GEOPROBE LOCATIONS SAMPLED DURING PHASE II INVESTIGATION

C. GEOCHEM, INC. ENVIRONMENTAL LABORATORIES
SAMPLE ANALYSES RESULTS and CHAIN-OF-CUSTODY RECORDS

D. REPRESENTATIVE PHOTOGRAPHS OF SITE

Appendix A

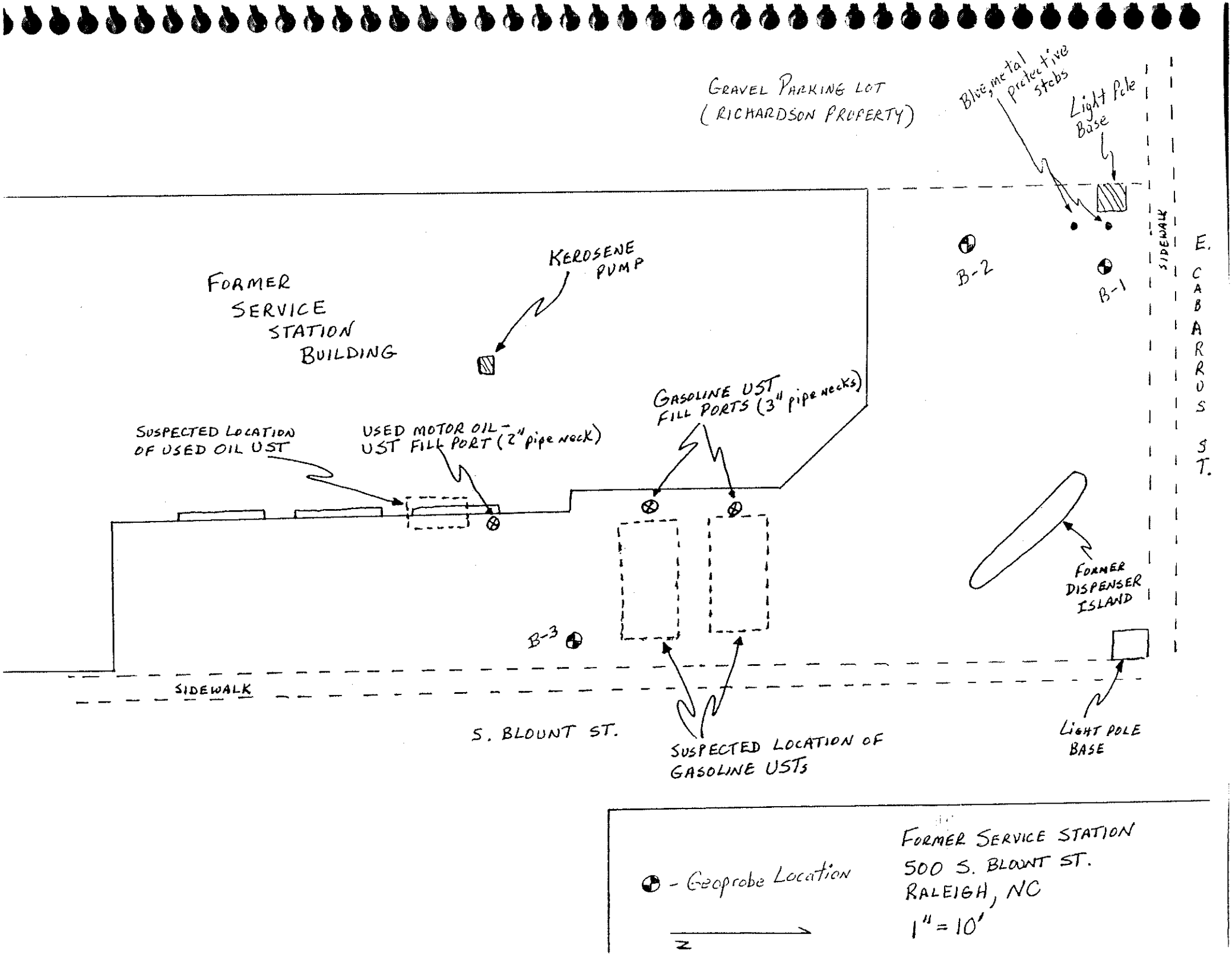
Site Location Map



Subject Property
Central Raleigh
One inch equals 0.33 mile.
© 2000, Rand McNally
BM
BN
BP
BQ
BR
BS
BT
BU
BV
BW
BX
86
87
88
89
90
91
92
93
94
95
POOLE RD
HICKORY MEADOWS
NEUSE WOODS
JONES SAUSAGE RD
WADE AV
WAKE FOREST RD
MORDECAI HIST PARK
PEACE COLL
OAKWOOD HISTORY DIST
BROUGHTON HIGH SCH
ST. MARY'S COLLEGE
HILLSBOROUGH ST
W EDENTON ST
MORGAN ST
PULLEN PARK
CENTRAL PRISON
W CABARRUS ST
W LENOIR ST
W SOUTH ST
E LENOIR ST
E SOUTH ST
SHAW UNIV
SMITHFIELD ST
CHAVIS HEIGHTS PARK
MARTIN LUTHER KING JR. BLVD
WALNUT TERRACE PARK
NORTH CAROLINA STATE UNIVERSITY CENTENNIAL CAMPUS
LAKE WHEELER RD
DOROTHEA DIX HOSP
ST. AUGUSTINE'S COLLEGE
LIONS CITY PARK
ROBERTS PARK
NC CORRECTIONAL CENTER FOR WOMEN
GLENWOOD AV
N DAWSON ST
MC DOWELL ST
SALISBURY ST
WILMINGTON ST
S PERSON ST
S BLOUNT ST

Appendix B

Site Sketch
and
Geoprobe Locations Sampled During Phase II Investigation


GRAVEL PARKING LOT
(RICHARDSON PROPERTY)
Blue, metal protective stubs
Light Pole Base
SIDEWALK
E. CABARRUS ST.
B-2
B-1
KEROSENE PUMP
FORMER SERVICE STATION BUILDING
GASOLINE UST FILL PORTS (3" pipe necks)
SUSPECTED LOCATION OF USED OIL UST
USED MOTOR OIL UST FILL PORT (2" pipe neck)
FORMER DISPENSER ISLAND
B-3
SIDEWALK
S. BLOUNT ST.
SUSPECTED LOCATION OF GASOLINE USTs
LIGHT POLE BASE
- Geoprobe Location
N
FORMER SERVICE STATION
500 S. BLOUNT ST.
RALEIGH, NC
1" = 10'

Appendix C

GeoChem, Inc. Environmental Laboratories
Sample Analyses Results
and
Chain of Custody Records

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 ,NC # 336, NC # 461, EPA ID # 155

Client Project Manager
Rob Livermon
Site Name:
500 S. Blount Street (City of Raleigh)

GeoLogix
5316 Deep Valley Run
Raleigh NC
27606

Report Date
Friday, January 19, 2001
PO #
Date Received in lab:
Monday, January 15, 2001

GCI Project #: 0101-017

Summary of requested analytical work

Sample type code #s :	*1 = solid samples;*	*2 = liquid samples;*	*3 = Air samples;*	*4 = sludges/unknowns*
Field Number: B-1-GW1	*Lab ID* 48	*Sample Type:* 2	*Date Analyzed:* 1/17/200	*for 3510*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-1-GW2	*Lab ID* 49	*Sample Type:* 2	*Date Analyzed:* 1/15/200	*for 602*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-3-GW1	*Lab ID* 50	*Sample Type:* 2	*Date Analyzed:* 1/17/200	*for 3510*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-3-GW2	*Lab ID* 51	*Sample Type:* 2	*Date Analyzed:* 1/15/200	*for 602*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-1-10	*Lab ID* 52	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 3550*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-1-10	*Lab ID* 52	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 5030 soil*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-1-15	*Lab ID* 53	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 3550*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-1-15	*Lab ID* 53	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 5030 soil*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-2-10	*Lab ID* 54	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 3550*
Date Sampled 1/13/2001			*Proper Preservation*	Yes

I Here by certify that I have Reviewed and approve this data set

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 ,NC # 336, NC # 461, EPA ID # 155

Client Project Manager
Rob Livermon
Site Name:
500 S. Blount Street (City of Raleigh)

GeoLogix
5316 Deep Valley Run
Raleigh NC
27606

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Friday, January 19, 2001
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Summary of requested analytical work

Sample type code #s :	*1 = solid samples;*	*2 = liquid samples;*	*3 = Air samples;*	*4 = sludges/unknowns*
Field Number: B-2-10	*Lab ID* 54	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 5030 soil*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-2-15	*Lab ID* 55	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 3550*
Date Sampled 1/13/2001			*Proper Preservation*	Yes
Field Number: B-2-15	*Lab ID* 55	*Sample Type:* 1	*Date Analyzed:* 1/15/200	*for 5030 soil*
Date Sampled 1/13/2001			*Proper Preservation*	Yes

I Kevin Bulla Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, EPA ID # 155

Site Name:
500 S. Blount Street (City of Raleigh)
GCI Project 0101-017

Friday, January 19, 2001

Field ID B-1-GW2	Lab ID 49	Conc. in ug/l	PQL in ug/l	NCAC 2L in ug/l
Date Analyzed: 1/15/2001				
602				
Field ID B-1-GW2	**Lab ID 49**			
Date Analyzed: 1/15/2001				
	Benzene	BDL	0.5	1.
	Toluene	BDL	0.5	1,000.
	Chlorobenzene	BDL	0.5	50.
	Ethylbenzene	BDL	0.5	29.
	Xylenes	BDL	1.5	530.
	1,3-Dichlorobenzene	BDL	0.5	620.
	1,4-Dichlorobenzene	BDL	0.5	75.
	1,2-Dichlorobenzene	BDL	0.5	620.
End of 602				
End of **B-1-GW2**				
602				
Field ID B-3-GW2	**Lab ID 51**			
Date Analyzed: 1/15/2001				
	Benzene	4,142.6	50	1.
	Toluene	6,787.8	50	1,000.
	Chlorobenzene	BQL	50	50.
	Ethylbenzene	1,227.2	50	29.
	Xylenes	11,813.6	150	530.
	1,3-Dichlorobenzene	BQL	50	620.
	1,4-Dichlorobenzene	BQL	50	75.
	1,2-Dichlorobenzene	BQL	50	620.
End of 602				
End of **B-3-GW2**				

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, EPA ID # 155

Friday, January 19, 2001

Site Name: 500 S. Blount Street (City of Raleigh)

GCI Project # 0101-017

			Conc. in mg/l	PQL in mg/l	NCAC 2L in mg/l
Field ID B-1-GW1	*Lab ID 48*				
	Date Analyzed: 1/17/2001				
	3510				
		Diesel range	BDL	0.5	N/A
Field ID B-3-GW1	*Lab ID 50*				
	Date Analyzed: 1/17/2001				
	3510				
		Diesel range	24.583	0.52083	N/A

GeoChem, Incorporated

Environmental Laboratories

FUEL IDENTIFICATION

The following sample contains gasoline and not diesel fuel:

50 (B-3-GW1)

Sincerely,

Kevin Behen

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, EPA ID # 155

Friday, January 19, 2001

GCI Project # 0101-017

Site Name: 500 S. Blount Street (City of Raleigh

			Conc. in mg/kg	PQL in mg/kg
Field ID **B-1-10**	*Lab ID 52*			
	Date Analyzed: 1/15/2001	*Dry Wt %: 0.84*		
		Diesel range	**BDL**	5.9
		Gasoline range	**BDL**	5.9
Field ID **B-1-15**	*Lab ID 53*			
	Date Analyzed: 1/15/2001	*Dry Wt %: 0.88*		
		Diesel range	**BDL**	5.7
		Gasoline range	**BDL**	5.7
Field ID **B-2-10**	*Lab ID 54*			
	Date Analyzed: 1/15/2001	*Dry Wt %: 0.82*		
		Diesel range	**BDL**	6.1
		Gasoline range	**BDL**	6.1
Field ID **B-2-15**	*Lab ID 55*			
	Date Analyzed: 1/15/2001	*Dry Wt %: 0.83*		
		Diesel range	**BDL**	6.0
		Gasoline range	**BDL**	6.0

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, EPA ID # 155

Friday, January 19, 2001

GCI Project # **0101-017**

lowest detection @ ideal conditions

	Percent Recovery	MDL. in ug/l
602		
Benzene	99	0.2
Toluene	96	0.13
Chlorobenzene	100	0.16
Ethylbenzene	98	0.2
Xylenes	98	0.6
1,3-Dichlorobenzene	96	0.34
1,4-Dichlorobenzene	101	0.14
1,2-Dichlorobenzene	93	0.06

End of 602

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, EPA ID # 155

Friday, January 19, 2001

GCI Project # 0101-017	Percent Recovery	lowest detection limit @ ideal conditions MDL. in mg/l
3510		
Diesel range	101	0.36

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, EPA ID # 155

GCI Project # 0101-017

Friday, January 19, 2001

Date Analyzed: 1/15/2001	*Dry Wt %: 0.88*	*Percent Recovery*	*Lab Blank*	*MDL. in mg/kg*
Diesel range		95	0	2.5

Date Analyzed: 1/15/2001	*Dry Wt %: 0.83*	*Percent Recovery*	*Lab Blank*	*MDL. in mg/kg*
Gasoline range		98	0	1.88

Report To:
Geologix, Inc.
c/o Rob Livermon
5316 Deep Valley Run
Raleigh NC 27606

GeoChem, Incorporated

2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560
Phone: (919) 460-8093 • Fax: (919) 460-0167

Bill To:
Geologix, Inc.
c/o Rob Livermon
5316 Deep Valley Run
Raleigh, NC 27606

Chain of Custody Record

PROJECT SITE NUMBER | PO#

SITE NAME: 500 S. Blount St. (City of Raleigh)

COLLECTED BY (Signature): Robert H. Livermon, Jr.

GEOCHEM PROJECT #: 0101-017

DATE DUE:

VERBAL / FAX / HARDCOPY: 859-4544

FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	NO. OF CONTAINERS PER LOCATION	3510	602	3550	5030	PRESERVATIONS/NOTES	LAB ID NO. (for lab use only)
B-1-GW1	5	H_2O	1/13/01 1110	1	X				Cool/Ice/HCL	0048
B-1-GW2	5	"	1/13/01 1110	2		X			"	0049
B-3-GW1	5	"	1/13/01 1255	1	X				"	0050
B-3-GW2	5	"	1/13/01 1255	2		X			"	
B-1-10	5	Soil	1/13/01 1020	2			X	X	Cooler/Ice (Individual jars for 3550 & 5030 on Sample B-1-10 only)	0054
B-1-15	5	Soil	1/13/01 1030	1			X	X		0055
B-2-10	5	Soil	1/13/01 1150	1			X	X		
B-2-15	5	Soil	1/13/01 1155	1			X	X		

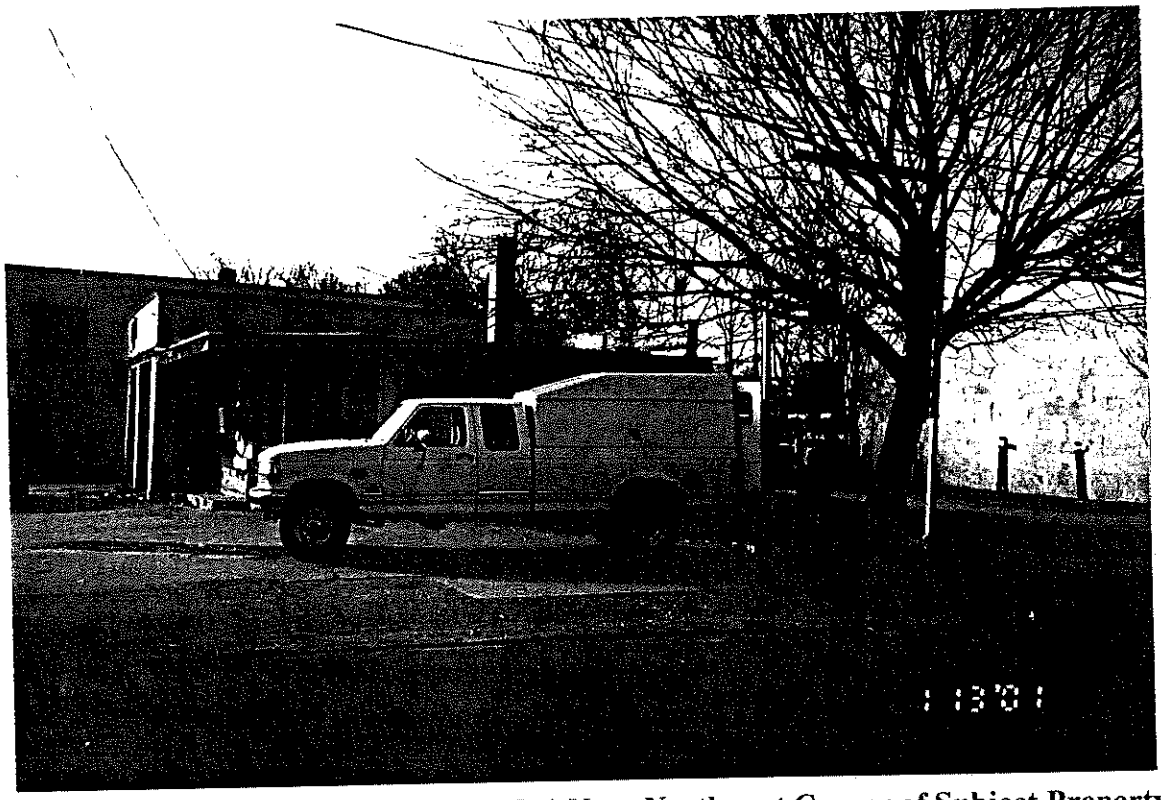
COMPLIANCE SAMPLES? Y (N) WHAT AGENCY? N/A

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME
[illegible]	1/15/01	14:00	[illegible]	1/15/01	14:00			

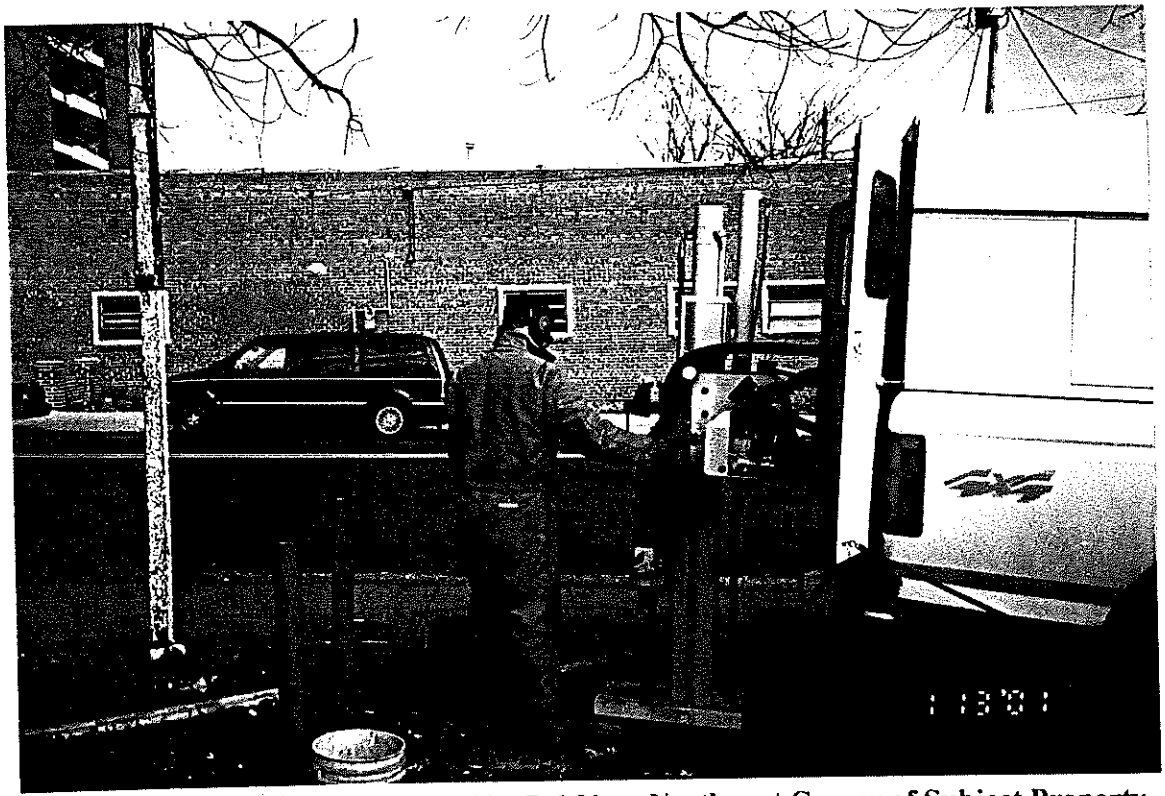
This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

Appendix D

Representative Photographs of Site

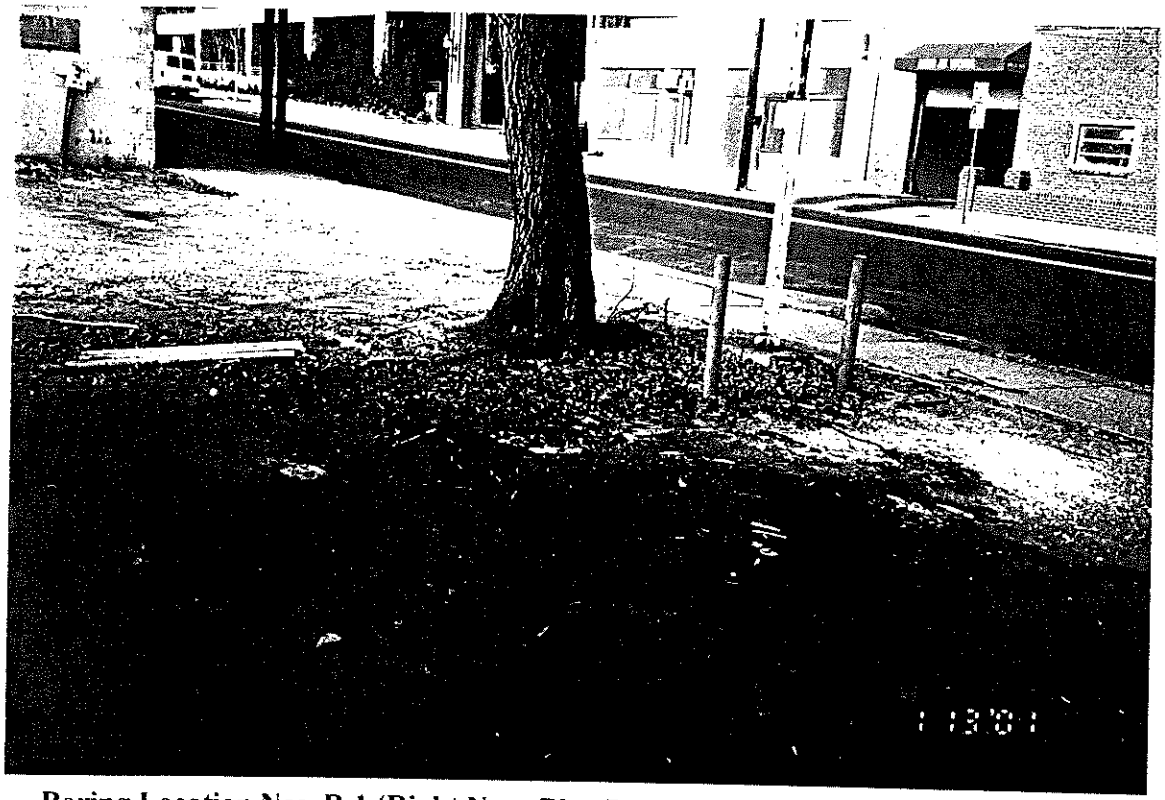


Geoprobe Rig Set Up at Location No. B-1 Near Northwest Corner of Subject Property



Advancing Geoprobe at Location No. B-1 Near Northwest Corner of Subject Property

Purging Groundwater in Probe Screen Prior to Taking Groundwater Sample at Location B-1

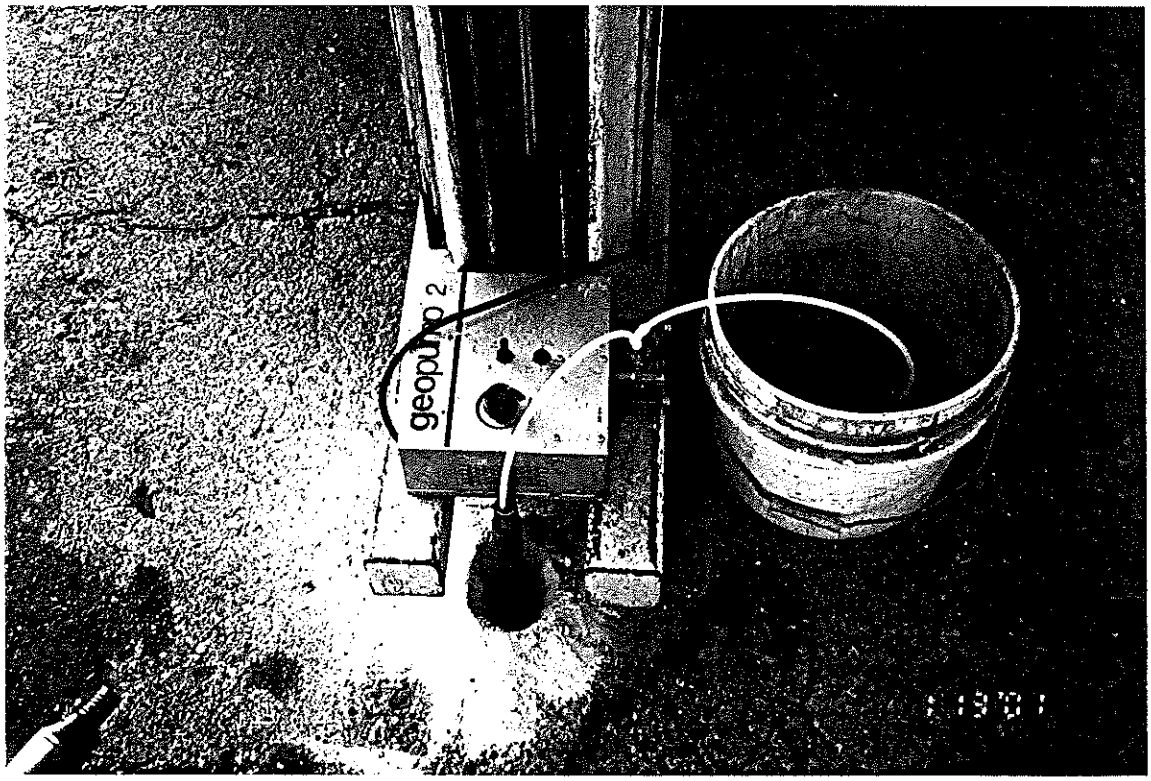


Boring Location Nos. B-1 (Right Near Blue Poles) and B-2 (Left at White Residue)

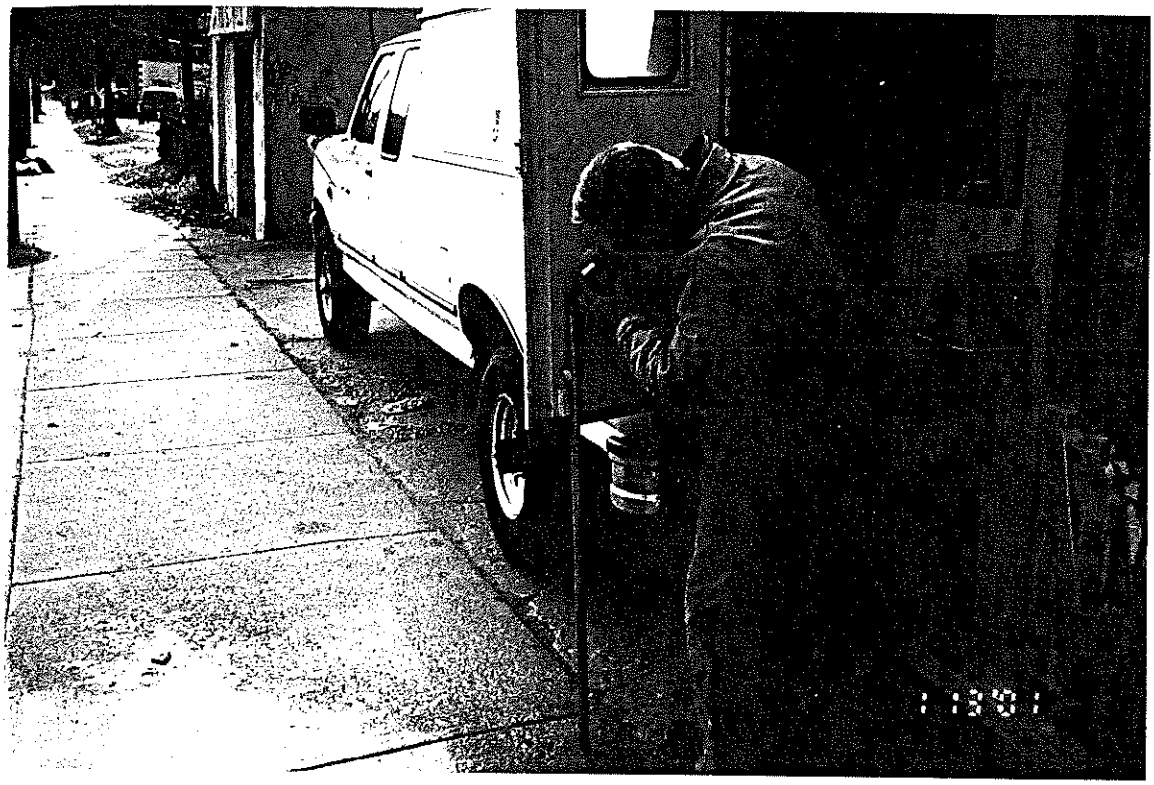
Geoprobe Location B-2 in Northwest Region of Subject Property

Geoprobe Set Up at Location B-3 - Facing Southwest From Across S. Blount St.

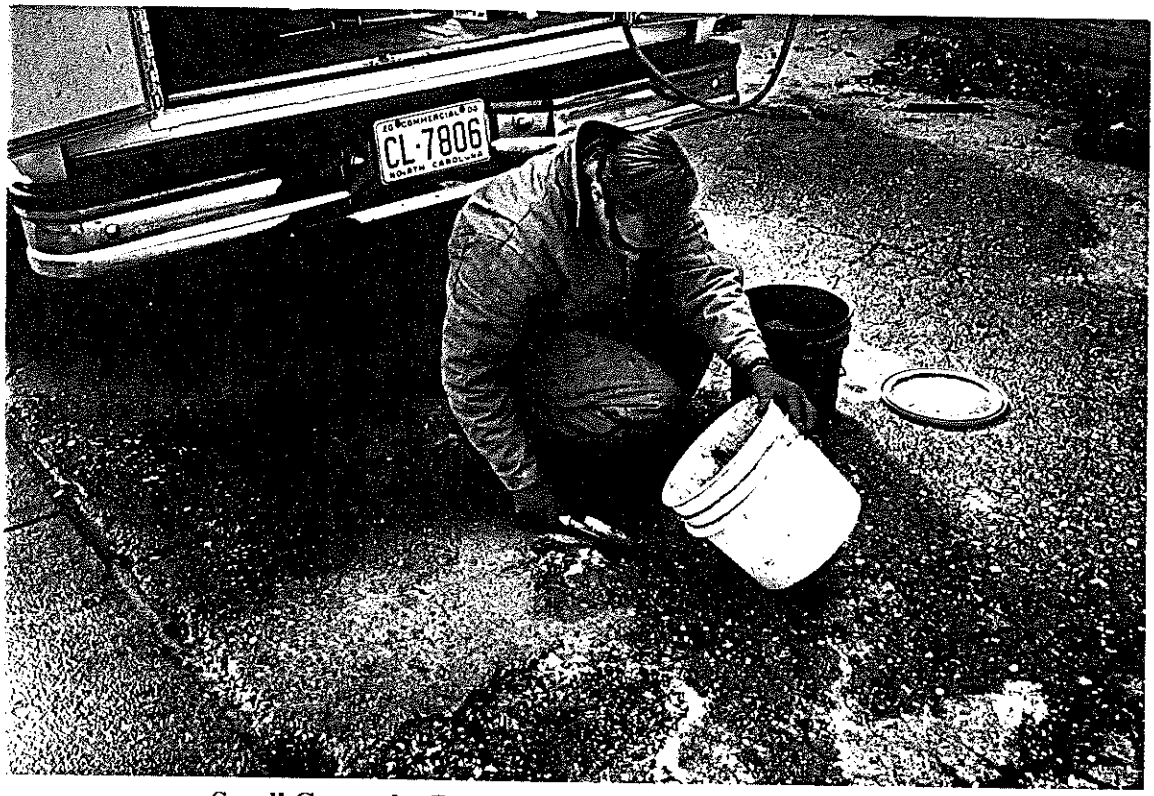
Advancing Geoprobe at Location B-3



Geopump Used to Pump Groundwater Sample to Surface at Location B-3



Decontaminating Geoprobe Screen Section at Location B-3



Small Geoprobe Bore Holes are Patched With Quikcrete